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REMARKS

Claims 5, 9, 11, 13, 15-19 and 23-25 have been amended to depend from claim 3 rather than cancelled claim 1. Also, claims 3, 6, and 29 have been amended to more clearly define Applicant's invention. In particular, these claims recite that the functional group of the modified pigment and of the polymer are anionic groups, ionizable groups that form anionic groups, or a mixture of anionic groups and ionizable groups that form anionic groups. Support for this amendment can be found throughout the present application and claims as original filed, including, for example, paragraphs [0019]-[0021] and [0023], as well as in the Examples and original claims 6, 8, and 22. Claims 8 and 22 have been cancelled in view of this amendment. Finally, claim 3 has been amended to correct a typographical error. No new matter has been added. Thus, claims 3, 5-7, 9, 11-13, 15-19, 23-25, 29, 33, and 49 are pending.

Claim Objections

The Examiner objects to claims 6, 8, and 22 as being in improper dependent form for failing to further limit the subject matter of a previous claim.

In paragraph 4 of the Office Action, regarding claims 6 and 8, the Examiner states that these claims fail to further limit the scope of claim 3 given that, while claim 3 requires that the modified pigment have attached at least one anionic functional group, claims 6 and 8 broadly require the functional group of the pigment "comprises at least one ionic group, at least one ionizable group, or a mixture of at least one ionic group and at least one ionizable group" and includes cationic group, which is outside the scope of claim 3.

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A similar objection was raised by the Examiner regarding claim 22, given that while claim 3 requires that the polymer have attached at least one anionic functional group, claim 22 broadly requires the functional group of the polymer "comprises at least one ionic group, at least one ionizable group, or a mixture of at least one ionic group and at least one ionizable group" and includes cationic group, which is outside the scope of claim 3.

In response, regarding claims 8 and 22, Applicant has amended claim 3 to recite that the functional group of the modified pigment and of the polymer are anionic groups, ionizable groups that form anionic groups, or a mixture of anionic groups and ionizable groups that form anionic groups. Claims 8 and 22 have been cancelled in view of this amendment. Claim 29 has been amended similarly. Support for this amendment can be found, for example, in paragraphs [0019]-[0021] of the present application, as well as the Examples, and original claim 6, 8, and 22.

Regarding claim 6, this claim, as amended, depends directly from claim 5 and recites a specific embodiment of the present invention in which the functional group of the modified pigment comprises at least one organic group, and the organic group comprises at least one anionic group, at least one ionizable group that forms an anionic group, or a mixture of at least one anionic group and at least one ionizable group that forms an anionic group. Support for this amendment can be found, for example, in paragraph [0023] as well as the Examples. Applicants believe that claim 6 is in proper dependent form since it further defines the functional group of the modified pigment, more broadly recited in claim 3, from which it indirectly depends.

Rejection of Claims under 35 U.S.C. § 112

The Examiner has rejected claims 5-9, 11-13, 15-19, and 22-25 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

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In paragraph 6 of the Office Action, the Examiner states that claims 5, 8, 9, 11, 13, 15, 16, 17-19, and 22-25 are confusing given that each depends from a cancelled claim (claim 1) and suggests these claims might be amended to depend from claim 3.

In response, Applicant has amended claims 5, 9, 11, 13, 15-19 to depend from claim 3 rather than cancelled claim 1. Claims 8 and 22 have been cancelled as discussed in more detail above, making the rejection of these claims moot.

Applicant therefore believes that claims 5-9, 11-13, 15-19, and 22-25 are not indefinite and respectfully requests that this rejection be withdrawn.

Rejection of Claims under 35 U.S.C. § 103(a)

Zhu et al. in view of Belmont et al. or Johnson et al.

The Examiner has rejected claims 3, 5-9, 11-13, 15-17, 22-25, and 29 under 35 U.S.C. § 103(a) as being unpatentable over Zhu et al. (U.S. Patent No. 6,251,175) in view of either Belmont et al. (U.S. Patent No. 5,713,988) or Johnson et al. (U.S. Patent No. 6,478,863).

In paragraph 8 of the Office Action, the Examiner states that Zhu et al. discloses ink jet ink comprising non-aqueous liquid vehicle, pigment, polymer that comprises anionic functional group (i.e., styrene-acrylic acid or polyacrylic acid), and salt having polyvalent metal cation such as calcium. The Examiner further states that a method wherein this ink is incorporated into an ink jet printer and then printed onto substrate is also disclosed.

The Examiner also states that the difference between Zhu et al. and the present invention is the requirement in the claims of specific pigment. However, the Examiner states that Belmont et al., which is drawn to non-aqueous ink jet inks, discloses the use of modified pigment comprising pigment having attached aromatic group containing anionic functional group such as carboxyl group, and Johnson et al., which is also drawn to non-aqueous ink jet inks, discloses the use of modified pigment comprising pigment having attached anionic functional group such as carboxyl group. The Examiner concludes that, in light of the motivation for using specific pigment disclosed by Belmont et al. or Johnson et al. to obtain

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the advantages taught in each reference, it would therefore have been obvious to one of ordinary skill in the art to use such pigment in the ink of Zhu et al. in order to produce ink with improved jetness and improved optical properties, or, alternatively, to produce ink with improved dispersibility, thereby arriving at the present invention.

Applicant respectfully disagrees. Regarding claims 3, 5-9, 11-13, 15-17, 22-25, claim 3 recites an ink composition comprising a) a liquid vehicle, which is a non-aqueous vehicle, b) at least one modified pigment comprising a pigment having attached at least one functional group, c) at least one salt having a polyvalent ion, and d) at least one polymer comprising at least one functional group. The functional group of the modified pigment and of the polymer are capable of coordinating with said polyvalent ion and are anionic groups, ionizable groups that form anionic groups, or a mixture of anionic groups and ionizable groups that form anionic groups, and the salt comprises a polyvalent metal cation.

By comparison, Zhu et al. describes a non-aqueous ink composition comprising an organic solvent, a colorant, and a hydroxyaromatic resin as a binder resin. Various additives may also be used. However, there is no disclosure, teaching, or suggestion of a modified pigment comprising a pigment having attached at least one functional group.

To cure this deficiency, the Examiner relies on Belmont et al., or, alternatively, Johnson et al., which both disclose non-aqueous ink compositions comprising modified pigments having attached anionic or anionizable groups. The Examiner therefore concludes that one skilled in the art would combine the teaching of these references and use the modified pigment of Belmont et al. or Johnson et al. in the ink of Zhu et al., thereby arriving at the present invention.

However, Applicant believes that one skilled in the art would not replace the colorants of Zhu et al. with the modified pigments disclosed in either Belmont et al. or Johnson et al., especially based on the teaching of Zhu et al. For example, while Zhu et al. states that the colorant may be "[a]ny dye, pigment, lake, or combination thereof, that may be dissolved or dispersed in the ink composition" (see column 3, lines 28-32), dyes are preferred, and a wide variety of examples of dyes are disclosed (see column 3, lines 32-67). Zhu et al. only generally states that the colorant can be a pigment, and there is no description or guidance anywhere in

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Zhu et al., including in the Examples, of the types of pigments that can be used. Also, along with the hydroxyaromatic resin, Zhu et al. shows that various additive binders can be used, and a wide variety of different types of resins are described, among them being styrene-acrylic acid resins and poly(meth)acrylic acid resins (see column 5, line 29 to column 6, line 59). Furthermore, Zhu et al. states that conductivity agents may be added, and a wide variety of types of agents are described, among them being calcium chloride.

Thus, in order to arrive at the present invention as recited in claim 3, one skilled in the art would have to 1) choose a pigment as the colorant, which is a non-preferred embodiment of Zhu et al. and is only generically disclosed, 2) choose, from among the many types of additive binders, one comprising an anionic group or a group that forms an anion, and 3) choose, from among the many conductivity agents that are described by Zhu et al. the only one that comprises a polyvalent metal cation, calcium chloride. Then, one skilled in the art would have to be motivated to replace the generic pigment of Zhu et al. with a modified pigment from either Belmont et al. or Johnson et al., and specifically choose one comprising a pigment having attached at least one anionic group or ionizable group that forms an anionic group, without any guidance or teaching from Zhu et al. of which pigments to use and what components (additive binder and conductivity agent) to combine it with. Applicant believes that choosing these specific components cannot be done based on the disclosure of the cited references and can only be done in hindsight based on the teaching of the present application.

Furthermore, Applicant believes that choosing the components described above would go against the teaching of Zhu et al. In particular, Zhu et al. clearly states that ink jet ink compositions must meet certain "rigid requirements" to be useful in ink jet printing operations, particularly relating to viscosity, resistivity, solubility, compatibility of components, and wettability of the substrate (see column 1, lines 34-45). Thus, one skilled in the art would recognize that replacement of one component, such as a generic pigment, for another, such as a specific type of modified pigment, in an ink jet ink composition is not straightforward. Furthermore, Zhu et al. specifically states that "[i]t is essential to the practice of the present invention that the jet ink compositions have a viscosity of from about 1.0 to about 10 cps ... in

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order to achieve the desired rheological characteristics" (see column 9, lines 1-6). For this reason, one skilled in the art would avoid combinations of components that would be expected to cause an undesirable rise in viscosity. This would include the use of salts comprising polyvalent metal cations with modified pigments and additive binders comprising anionic groups or ionizable groups that form anionic groups, since it would be expected that such salts would destabilize these types of stable dispersions of modified pigments. These would not be considered to be compatible components. This is further supported by observations included in the present application and, in particular, paragraph [0046], which states that "addition of the salt may result in flocculation of the pigment". Such flocculation would be avoided by one skilled in the art in order to maintain the essential viscosity feature of Zhu et al.

Therefore, one skilled in the art would not be motivated to replace a generic pigment of the ink jet ink of Zhu et al. which further comprises a polyvalent metal cation, such as calcium chloride, and an additive binder comprising an anionic group or an ionizable group that forms an anionic group, with a modified pigment comprising a pigment having attached at least one anionic group or ionizable group that forms anionic groups, and have a reasonable expectation of successfully meeting the essential requirements set out in Zhu et al.. In fact, destabilization of the pigment dispersion would have been expected, and, for this reason, the combination of modified pigment having an anionic functional group and a polyvalent metal cationic salt would have been avoided. Without a reasonable expectation of success, found in the prior art and not in Applicant's disclosure, a *prima facie* case of obviousness cannot be established (see MPEP 706.02(j)).

Applicant therefore believes that claim 3 is patentable over Zhu et al. in view of Belmont et al. or Johnson et al. Claims 5-7, 9, 11-13, 15-17, and 23-25, which depend either directly or indirectly from claim 3, recite further embodiments of the present invention and, for at least the reasons discussed above, are also patentable over these references. Claims 8 and 22 have been cancelled by this amendment, making the rejection of these claims moot.

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Regarding claim 29, as amended, this claim recites a method of generating an image comprising incorporating into a printing apparatus an ink composition of the present invention, as recited in claim 3, and generating an image on a substrate. Since, as discussed above, Applicant believes the ink composition of claim 3 is patentable over Zhu et al. in view of Belmont et al. or Johnson et al., Applicant further believes that an inkjet printing method using this inkjet ink is also patentable over this combination of references.

Therefore, Applicant believes that claims 3, 5-9, 11-13, 15-17, 22-25, and 29 are patentable over Zhu et al. in view of Belmont et al. or Johnson et al., and respectfully requests that this rejection be withdrawn.

Zhu et al. in view of Belmont et al. or Johnson et al. and further in view of Lin

The Examiner has rejected claims 18-19 under 35 U.S.C. § 103(a) as being unpatentable over Zhu et al. (U.S. Patent No. 6,251,175) in view of either Belmont et al. (U.S. Patent No. 5,713,988) or Johnson et al. (U.S. Patent No. 6,478,863), as applied to claims 3, 5-9, 11-13, 15-17, 22-25, and 29 above, and further in view of Lin (U.S. Patent No. 5,997,623).

In paragraph 9 of the Office Action, the Examiner states that the difference between Zhu et al. in view of Belmont et al. or Johnson et al. and the present claimed invention is the requirement in the claims of specific type of salt. However, the Examiner states that Lin, which is drawn to ink jet inks, discloses using salt comprising polyvalent metal cation such as zinc and polyvalent metal anion such as sulfate in order to produce ink with conductivity suitable for ink jet printing and further discloses the equivalence and interchangeability of such salt with calcium chloride as disclosed by Zhu et al. The Examiner concludes that, in light of the motivation for using such salt disclosed by Lin as described above, it would have been obvious to one of ordinary skill in the art to use such salt as the salt in Zhu et al., and thereby arrive at the claimed invention.

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Applicant respectfully disagrees. Claims 18 and 19 depend directly from claim 3 and, as discussed in more detail above, Applicant believes claim 3 is patentable over Zhu et al. in view of either Belmont et al. or Johnson et al. Therefore, claims 18 and 19 are also patentable over this combination of references.

Furthermore, Lin cannot cure the deficiencies of Zhu et al. in view of either Belmont et al. or Johnson et al. While Lin shows the use of polyvalent metal cation such as zinc in an inkjet ink composition, these are in an aqueous ink jet ink comprising water, a colorant such as a dye or a pigment, and a diol derivative having a specified formula. Thus, Lin cannot be combined with Zhu et al. in view of either Belmont et al. or Johnson et al., since these relate to non-aqueous compositions. Furthermore, Lin is also not relevant art to the present claims, since claims 18 and 19 relate to non-aqueous ink jet ink compositions. In addition, while it appears this reference is being cited for its presumed equivalence and interchangeability of types of salts, this would only be a consideration for aqueous inks.

Therefore, Applicant believes that claims 18 and 19 are patentable over Zhu et al. in view of either Belmont et al. or Johnson et al., and further in view of Lin, and respectfully request that this rejection be withdrawn.

Allowable Subject Matter

In paragraph 10 of the Office Action, the Examiner states that claims 33 and 49 are allowable over the "closest" prior art cited.

Applicant is grateful for the allowable subject matter of claims 33 and 49. In addition, as discussed in more detail above, Applicant believes that the remaining pending claims should also be found allowable.


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Conclusion

In view of the foregoing remarks, Applicant believes that this application is in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would further expedite the prosecution of the subject application, the Examiner is invited to call the undersigned.

Respectfully submitted,

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